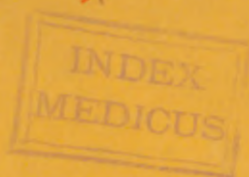


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*Old and Neglected Deformities Following  
Infantile Spinal Paralysis.*

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Surgeons; President Ohio Pediatric Society; Mem-  
ber American Medical Association, Etc.

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*Read before American Orthopedic Association.*

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## OLD AND NEGLECTED DEFORMITIES FOLLOWING INFANTILE SPINAL PARALYSIS.

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The orthopedic specialist seldom sees a case of anterior poliomyelitis of infants during the acute attack, and he is seldom called until marked deformity exists. If a specialist is called to consult with the general practitioner during the early course of the trouble, it would very naturally be the neurologist instead of the orthopedic. These cases are found almost everywhere. In every small town you will find what the local profession will say are hopeless incurables, either crawling about on their hunkers, or hauled about in carriages, etc., and the friends of these unfortunates take it for granted that nothing can be done for them. On the contrary, they are the cases that are the most promising, and the deformity is the most quickly corrected. By this I do not mean to convey the idea that the surgeon experiences no difficulty in the cure of this trouble, but as compared with other classes of deformities; for instance, of a congenital talipes equino-varus and a paralytic equino-varus of ten years' standing, the latter deformity can be more promptly corrected. In the congenital deformity, mechanical treatment will generally be relied upon, and the stretching of tendons by appliances and holding them in position by the same method, is a procedure that requires time. In the paralytic cases, on the other hand, mechanical treatment is out of the question, and the operative treatment must be resorted to. By the operative treatment I do not mean that in cases of subluxation at the knee an osteotomy is always necessary, or indeed is it always necessary to do an osteotomy; or in an old case of club foot, it is but rarely necessary to remove a wedge-shaped piece of the foot, or to enucleate the astragalus.

The general surgeon is more likely to correct the deformity at one sitting; the instrument maker, in whose hands these





cases very frequently fall, depends upon braces entirely. The orthopede fills in the chink between the general surgeon and the brace maker, and gives patients the benefit of both of the foregoing extremes, and, in addition, bridges the chasm that must necessarily otherwise exist.

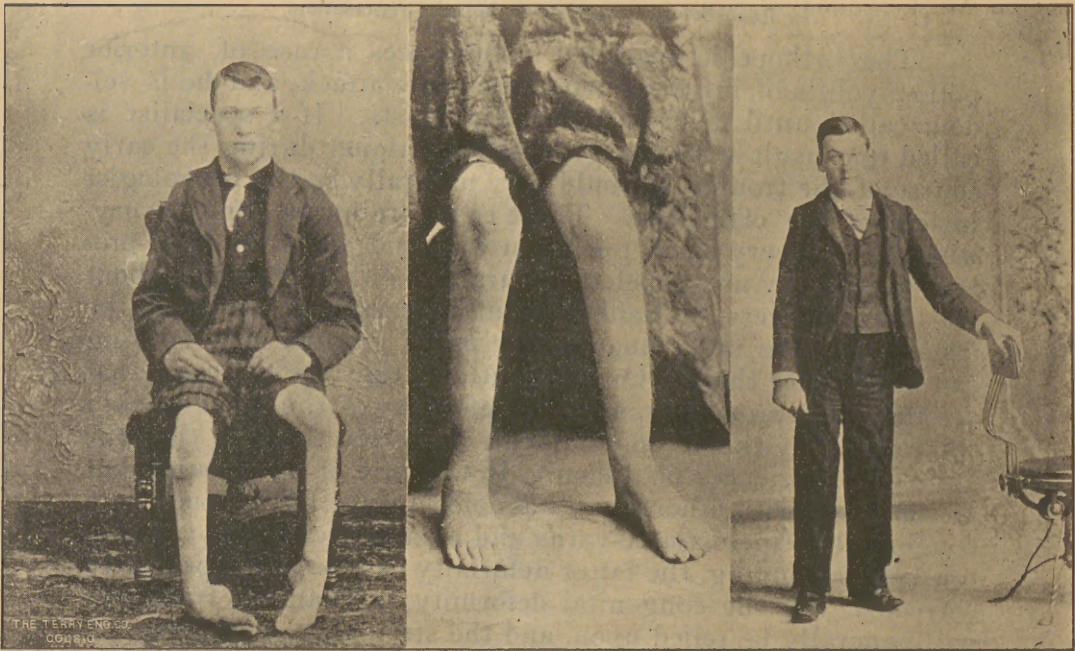
It is seldom necessary to destroy the bony continuity of a foot, even in the worst cases of talipes, but it is a common occurrence for general surgeons to do a cuneiform osteotomy through the tarso-metatarsal joint, or to enucleate the astragalus. But sub-

FIG. 1.

A.

B.

C.



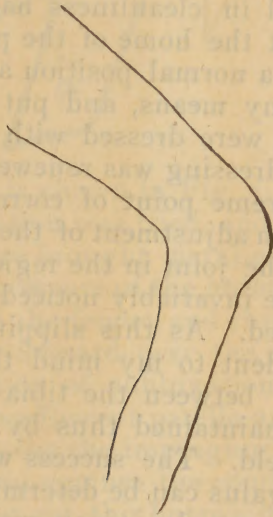
cutaneous tenotomy and a Thomas wrench are generally sufficient. It is seldom necessary to more than do a subcutaneous tenotomy of the ham-string in subluxation dependent upon false ankylosis, but the general surgeon would expect to completely restore the limb to parallelism at one sitting, regardless of the extent of the operation.

Experience has demonstrated to me the wisdom of making haste slowly in the restoration to the normal of joints that have been in abnormal positions for years,



Case 1, Fig. A.—M. C., aged 17. When two years old had an attack of anterior polio-myelitis with sudden onset, high fever, convulsions, etc., after which he was completely paralyzed, i. e., paralyzed of both upper and lower extremities. This paralysis was continuous until he was about four years of age, when he began to have some use of his arms and legs. The right arm gained more rapidly than the left, and the left arm more rapidly than the lower extremities. When treatment was begun, 14 years after the onset, he was crawling around on his hunkers, as he had been for all these years except during the past two or three when he had been riding in a tricycle. As shown in Fig. 1—A, he had an exaggerated talipes equino-varus of the right foot, which could not be corrected by manipulation, and a subluxation of the left knee at an angle of 45 degrees

FIG. 2.



(Fig. 2). Owing to the fact that the deformities had existed for so many years, the bones were held in their abnormal position by dense adhesions. The rule to which prominence has been given by Phelps, viz.: cut every tissue that offers resistance, beginning with the tissue that offers the greatest resistance, and continue to cut until the foot can be returned to a super-corrected, or at least corrected position, was observed as nearly as possible. Under A. C. E., the tendo-Achilles was first tenotomized; the plantar fascia next, and, finally, the deltoid ligament had to be completely severed before the foot could be approximated to the normal. The Thomas wrench, or twister, was used to break up adhesions and rupture the shortened ligaments about the tar-



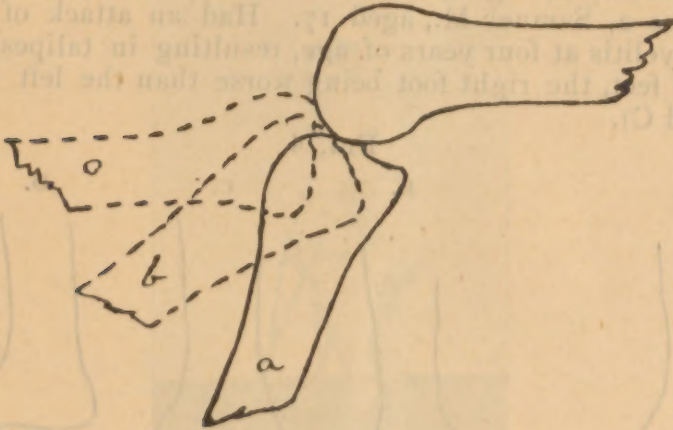
sal bones. Great force had to be used with the twister to do this. The tenotomies were done subcutaneously of course. In dividing the deltoid ligament, an artery, possibly a continuation of the posterior tibial, or at least a considerable branch, was cut, but as the cutaneous puncture was about an inch from the point of injury to the artery, pressure soon controlled the hemorrhage. The astragalus, which had been of course dislocated during all these years, could not be reduced, i. e., could not be pushed back between the tibia and os calcis.

Phelps' open operation occurred to me, but was not demanded, because, had the plantar surface of the foot been laid completely open the ligamentous resistance to the return of the astragalus would not have been removed. Enucleation of the astragalus as practiced by many, and notably Gibney, was considered, and would doubtless have been performed but for the fear that some detail in cleanliness had been neglected (the operation was done at the home of the patient). The foot was brought as nearly to a normal position as possible, but was not super-corrected by any means, and put up in plaster-of-Paris. The skin punctures were dressed with gauze and protective. The plaster-of-Paris dressing was renewed once a week, and the foot held to the extreme point of correction until the plaster was hard. After each adjustment of the plaster the patient suffered great pain in the joint in the region of the astragalus for an hour or so, but he invariably noticed "something slip" and the pain was relieved. As this slipping occurred after every dressing, it was evident to my mind that the astragalus was wedging itself back between the tibia and os calcis, and the forcible correction maintained thus by the plaster caused the soft structures to yield. The success we had in effecting a reduction of the astragalus can be determined by examining Fig. 1 B. This patient was also given massage, electricity by the Faradic current, and gymnasium exercises. To carry out the latter, two poles twelve feet long were rigged up in his room, placed high enough to support his hands and allow his feet to rest on the floor. At first he was given five minutes morning and afternoon, and the time was extended two minutes daily up to one hour in the forenoon and one hour in the afternoon. Result of treatment is shown in Fig. 1—C.

The subluxation of the left knee joint, in case 1, Fig. 1—A, Fig. 2, required tenotomies of the ham-strings and forcible breaking up of the adhesions between the bones and about the joint. It was impossible to completely correct the deformity

here, as in the case of the foot, i. e., a parallelism could be had between the thigh and leg, but the leg was upon a lower plane than the thigh. This was due to the fact that the head of the tibia did not slip down and forward upon the condyles, but instead the relationship of these bones was not disturbed. The

FIG. 3.



condition that existed is shown in Fig. 3, "a" representing the condition before correction was tried, and "b" and "c" the condition as the bones were brought parallel, which, as may be observed, increases the pressure of the anterior surface of the tibia against the condyle of the femur, and thus prevents the head of the tibia from gliding forward over the condyles of the femur.

Immediate reduction of subluxation of the knee joint is prevented, 1st—by the adherent patella and synovial membrane to the condyles; 2nd—by the impinging of the anterior portion of the head of the tibia against the condyles. In cases where the ham-strings are not cut, this burrowing in of the bones upon each other is much greater, and an immediate reduction is less likely to be effected.

Gradual and continuous leverage offered the best means for correcting the deformity mechanically. After the severe manipulation and tenotomies, the joint was put up in plaster-of-Paris and kept there for about three weeks, or until all inflammation had subsided. At this time, very little progress had been made toward restoring the normal relations of the joint. A perfectly plain splint was used, to which the leg was bandaged, and the knee was drawn down as close to the splint as possible, or to the tolerance of the patient. This was tightened about every

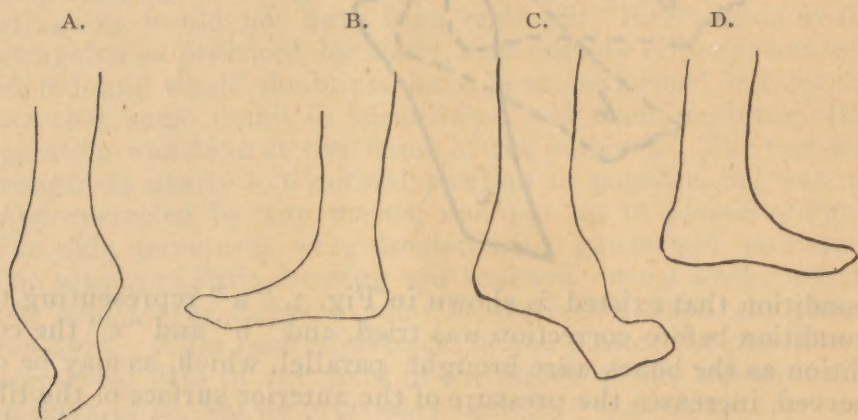


other day, or as often as was necessary to keep the bandage tight. Here, as was experienced after forcible correction of the talipes, the patient experienced a slipping or letting loose in the joint, and the pain caused by the forcible correction was relieved thereafter.

The success we had in the treatment is shown by comparing A with B and C, Fig. 1, taken six months apart.

Case 2, Samuel M., aged 17. Had an attack of antero-polio-myelitis at four years of age, resulting in talipes equinus in both feet, the right foot being worse than the left (see Fig. 4 A and C).

FIG. 4.



The case came to my clinic at Ohio Medical University, Columbus, Ohio, January 12th, 1893, and was sent to the Protestant Hospital for operation. Operation required tenotomy of tendo-Achilles and plantar fascia of both feet, and forcible breaking up of adhesions about the tarsal bones with a Thomas wrench. The feet were put up in plaster-of-Paris, and new dressings re-applied once a week for four weeks, when the patient was able to walk home on crutches. Fig. 4, A, shows the right foot before, and B after treatment, and C shows the left foot before, and D after treatment. The patient always used crutches before treatment, but has no need of them since. Recovery practically perfect.

Case 3, Clarence G., aged nine. When 11 months old he had fever and severe convulsions. While yet in his mother's arms she noticed that he was completely paralyzed on his left side. He had been able to walk before the attack of anterior polio-myelitis, but it was about one year after before he began



to creep and he did not get upon crutches until three years later, or when about five years old. For the succeeding four years he walked with crutches. (See Fig. 5.) Operation consisted in

FIG. 5.



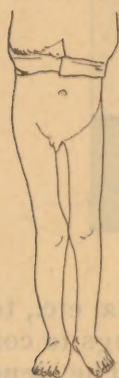
tenotomies of tensor vaginae femoris, fascia, etc., to liberate the thigh at the hip joint, and of the ham-strings to correct the subluxation and flexion at the knee. The tenotomies were done subcutaneously. The patient was put up in plaster-of-Paris from the thorax to the heel, and allowed to remain so for about two weeks. In order to make the plaster dressing lighter and less likely to break over the hip and under the knee, pieces of iron were put in over these joints, as is the practice in the New York Institute for Ruptured and Crippled. (The case is shown in Figs. 5, 6, and 7.) As a retaining splint, shown in Fig. 6, after the first few weeks, he wore a Thomas Hip Splint, with an outside piece riveted to rings at thigh and calf, and fastened to the foot at the heel. It was also necessary to use an abduction arm, see Fig. 6, owing to the great tendency to that deformity. The patient now has entire control of the hip. The brace was cut off at upper end of the double bars, or at thigh ring, which removed all support to the hip joint, and the lower or knee portion was used. He can walk without crutch or cane.

Hilton gives us an anatomical law that the nerve that supplies a joint, also supplies the muscles that control the motion of the joint and the skin which covers the same. The force of the law is demonstrated in many pathological conditions, but very forcibly in paralytic deformities. When joints are in deformed positions, the trophic nerves distributed to the muscles controlling the joint do not perform their function normally. When a joint, which has been in an abnormal position for years, is restored to a normal position, the power of the nerves to perform the trophic function is increased, and the muscles

FIG. 7.



FIG. 6.



that have shown no signs of development for years, begin to increase in size and strength. A remarkable development of muscles was shown in this case, as I have observed in others.

The rule is that after a plaster-of-Paris cast is adjusted, it gets loose in a few days; but just the opposite condition has always been observed in all my paralytic cases.

#### SUMMARY OF TREATMENT.

Operative: { 1. Tenotomy.  
2. Osteotomy, rarely.  
3. *Brisement force*.

Mechanical: { 1. Retentive { Plaster-of-Paris and other splints.  
Braces.  
2. Corrective { Gymnastics.  
Massage.  
Manipulation.

Electricity.





